



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 04:57 PM UTC

PDB ID : 6LGO / pdb_00006lgo
Title : Crystal structure of cystathionine gamma synthase from *Xanthomonas oryzae* pv. *oryzae* in complex with homolanthionine
Authors : Ngo, H.P.T.; Nguyen, T.D.Q.; Kang, L.W.
Deposited on : 2019-12-05
Resolution : 2.39 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

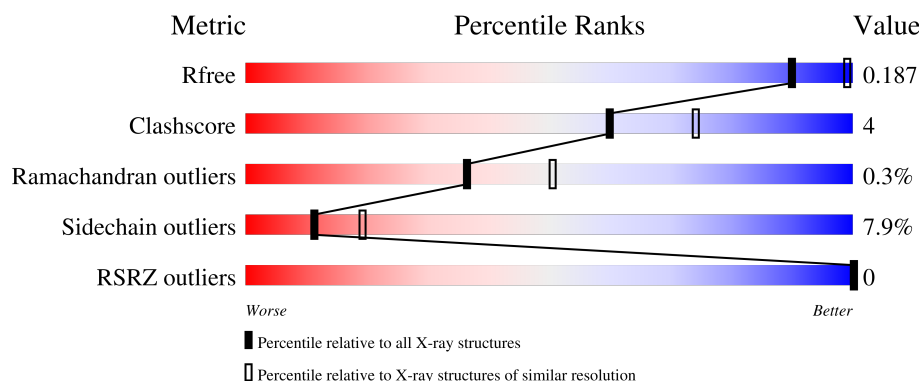
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.39 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	408	
1	B	408	
1	C	408	
1	D	408	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	EBO	B	501	-	X	-	-
2	EBO	C	501	-	X	-	-
2	EBO	D	501	-	X	-	-

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 11993 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

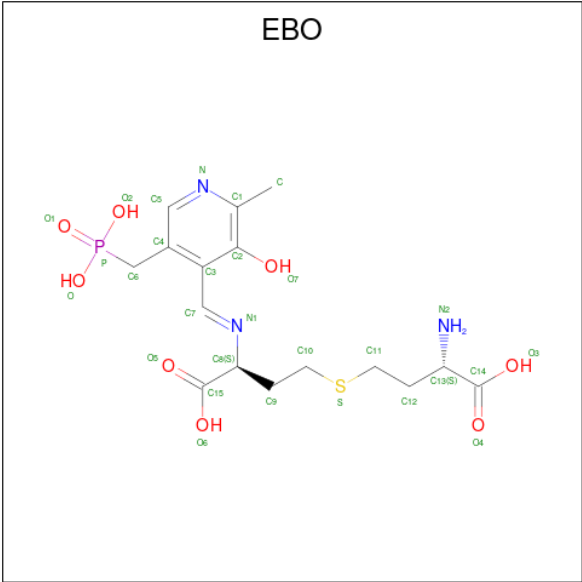
- Molecule 1 is a protein called Cystathionine gamma-synthase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	387	Total	C	N	O	S	0	0	0
			2870	1814	506	543	7			
1	B	387	Total	C	N	O	S	0	0	0
			2870	1814	506	543	7			
1	C	387	Total	C	N	O	S	0	0	0
			2870	1814	506	543	7			
1	D	387	Total	C	N	O	S	0	0	0
			2870	1814	506	543	7			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q5H1U9
A	-1	SER	-	expression tag	UNP Q5H1U9
A	0	HIS	-	expression tag	UNP Q5H1U9
A	134	VAL	ASP	engineered mutation	UNP Q5H1U9
B	-2	GLY	-	expression tag	UNP Q5H1U9
B	-1	SER	-	expression tag	UNP Q5H1U9
B	0	HIS	-	expression tag	UNP Q5H1U9
B	134	VAL	ASP	engineered mutation	UNP Q5H1U9
C	-2	GLY	-	expression tag	UNP Q5H1U9
C	-1	SER	-	expression tag	UNP Q5H1U9
C	0	HIS	-	expression tag	UNP Q5H1U9
C	134	VAL	ASP	engineered mutation	UNP Q5H1U9
D	-2	GLY	-	expression tag	UNP Q5H1U9
D	-1	SER	-	expression tag	UNP Q5H1U9
D	0	HIS	-	expression tag	UNP Q5H1U9
D	134	VAL	ASP	engineered mutation	UNP Q5H1U9

- Molecule 2 is (2 {S})-2-azanyl-4-[(3 {S})-3-[({E})-[2-methyl-3-oxidanyl-5-(phosphonomethyl)pyridin-4-yl]methylideneamino]-4-oxidanyl-4-oxidanylidene-butyl]sulfanyl-butanoic acid (CCD ID: EBO) (formula: C₁₆H₂₄N₃O₈PS) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			29	16	3	8	1	1		
2	B	1	Total	C	N	O	P	S	0	0
			29	16	3	8	1	1		
2	C	1	Total	C	N	O	P	S	0	0
			29	16	3	8	1	1		
2	D	1	Total	C	N	O	P	S	0	0
			29	16	3	8	1	1		

- Molecule 3 is water.

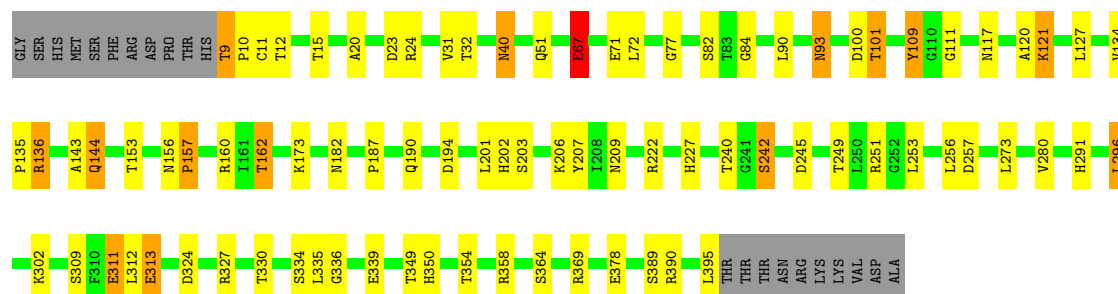
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	95	Total	O	0	0
			95	95		
3	B	98	Total	O	0	0
			98	98		
3	C	105	Total	O	0	0
			105	105		
3	D	99	Total	O	0	0
			99	99		

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

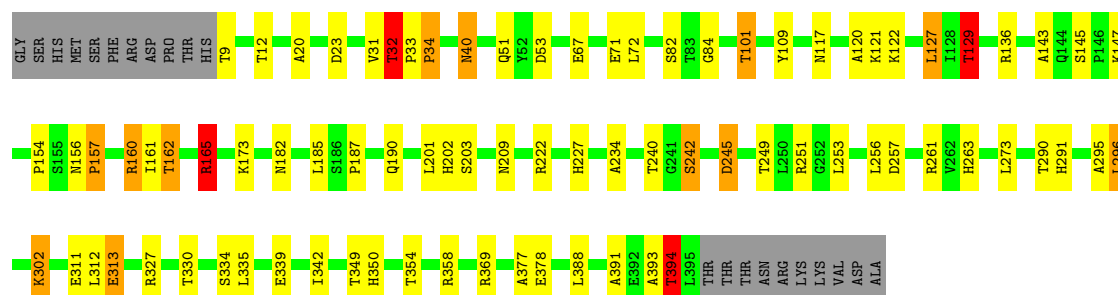
• Molecule 1: Cystathionine gamma-synthase

Chain A: 



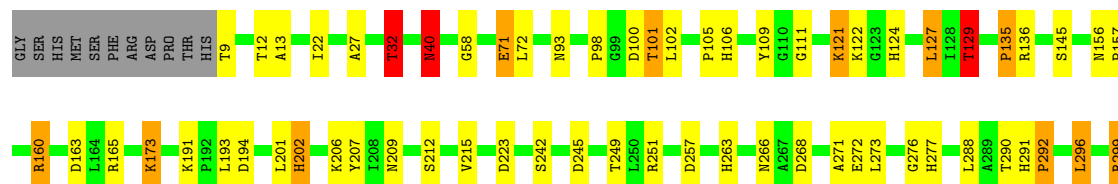
• Molecule 1: Cystathionine gamma-synthase

Chain B: 



• Molecule 1: Cystathionine gamma-synthase

Chain C: 





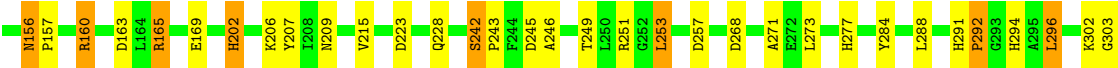
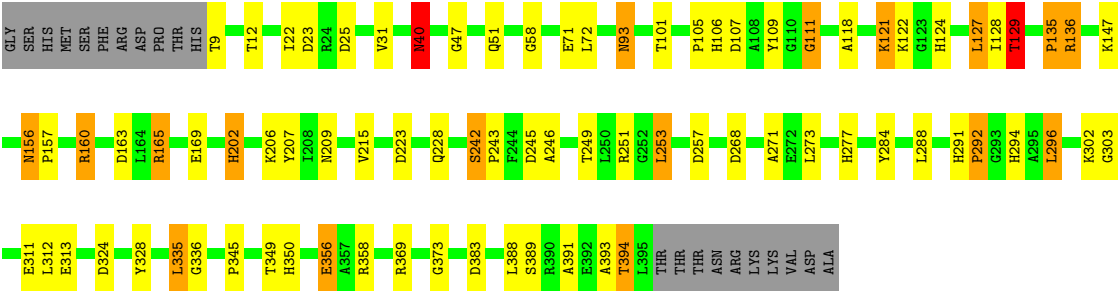
● Molecule 1: Cystathionine gamma-synthase

Chain D:

75%

15%

5%



4 Data and refinement statistics

Property	Value	Source
Space group	I 41	Depositor
Cell constants a, b, c, α , β , γ	161.22Å 161.22Å 244.91Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.07 – 2.39 47.07 – 2.39	Depositor EDS
% Data completeness (in resolution range)	96.2 (47.07-2.39) 96.2 (47.07-2.39)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	7.42 (at 2.39Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.154 , 0.181 0.162 , 0.187	Depositor DCC
R_{free} test set	5900 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å ²)	29.8	Xtriage
Anisotropy	0.030	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 5.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.486 for h,-k,-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11993	wwPDB-VP
Average B, all atoms (Å ²)	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.95% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: EBO

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	1.42	18/2924 (0.6%)	1.63	37/3980 (0.9%)
1	B	1.47	25/2924 (0.9%)	1.68	39/3980 (1.0%)
1	C	1.53	30/2924 (1.0%)	1.65	36/3980 (0.9%)
1	D	1.53	28/2924 (1.0%)	1.60	31/3980 (0.8%)
All	All	1.49	101/11696 (0.9%)	1.64	143/15920 (0.9%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
1	B	0	2
1	C	0	3
1	D	0	3
All	All	0	10

All (101) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	202	HIS	CE1-NE2	11.04	1.43	1.32
1	D	202	HIS	CE1-NE2	10.67	1.43	1.32
1	B	51	GLN	C-O	-8.50	1.14	1.24
1	D	105	PRO	C-O	-8.46	1.14	1.23
1	C	257	ASP	CG-OD2	8.31	1.41	1.25
1	D	268	ASP	C-O	-7.86	1.15	1.24
1	B	330	THR	C-O	7.46	1.32	1.24
1	C	215	VAL	C-O	7.42	1.32	1.24
1	B	291	HIS	CE1-NE2	7.41	1.40	1.32
1	C	106	HIS	C-O	-7.29	1.15	1.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	358	ARG	C-O	7.26	1.32	1.24
1	B	121	LYS	C-O	-7.19	1.15	1.24
1	B	34	PRO	C-O	-7.05	1.15	1.23
1	A	84	GLY	C-O	7.03	1.32	1.23
1	C	124	HIS	CE1-NE2	6.98	1.39	1.32
1	C	373	GLY	C-O	6.96	1.30	1.23
1	D	245	ASP	CG-OD2	6.89	1.38	1.25
1	D	277	HIS	CE1-NE2	6.87	1.39	1.32
1	D	373	GLY	C-O	6.84	1.30	1.23
1	B	227	HIS	CE1-NE2	6.70	1.39	1.32
1	A	187	PRO	C-O	-6.67	1.15	1.24
1	C	71	GLU	C-O	-6.63	1.16	1.24
1	C	193	LEU	C-O	-6.61	1.15	1.24
1	D	22	ILE	C-O	-6.60	1.16	1.24
1	D	257	ASP	CG-OD2	6.58	1.37	1.25
1	C	40	ASN	C-O	6.56	1.32	1.23
1	D	51	GLN	C-O	-6.51	1.16	1.24
1	B	84	GLY	C-O	6.48	1.31	1.23
1	D	58	GLY	C-O	6.48	1.32	1.23
1	B	20	ALA	C-O	6.42	1.31	1.24
1	C	105	PRO	C-O	-6.41	1.16	1.23
1	B	257	ASP	CG-OD1	6.40	1.37	1.25
1	C	358	ARG	C-O	6.36	1.31	1.24
1	D	40	ASN	C-O	6.33	1.31	1.23
1	B	23	ASP	CG-OD1	6.32	1.37	1.25
1	B	377	ALA	C-O	6.29	1.31	1.24
1	C	268	ASP	C-O	-6.16	1.17	1.24
1	A	51	GLN	C-O	-6.12	1.17	1.24
1	C	13	ALA	C-O	6.12	1.31	1.24
1	A	121	LYS	C-O	-6.10	1.17	1.24
1	A	227	HIS	CE1-NE2	6.08	1.38	1.32
1	C	22	ILE	C-O	-5.99	1.17	1.24
1	D	288	LEU	C-O	5.98	1.31	1.24
1	A	257	ASP	CG-OD2	5.97	1.36	1.25
1	C	145	SER	N-CA	5.96	1.50	1.46
1	D	294	HIS	C-O	5.93	1.30	1.24
1	D	215	VAL	C-O	5.90	1.31	1.24
1	B	187	PRO	C-O	-5.87	1.16	1.24
1	B	354	THR	C-O	5.85	1.32	1.23
1	D	302	LYS	C-O	-5.78	1.16	1.23
1	D	111	GLY	C-O	5.76	1.30	1.23
1	B	263	HIS	CD2-NE2	-5.75	1.31	1.37

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	328	TYR	C-O	-5.75	1.16	1.24
1	C	194	ASP	C-O	-5.74	1.16	1.24
1	C	27	ALA	C-O	-5.69	1.17	1.24
1	D	284	TYR	C-O	5.67	1.30	1.24
1	C	160	ARG	CD-NE	-5.64	1.38	1.46
1	C	245	ASP	CG-OD2	5.64	1.36	1.25
1	A	330	THR	C-O	5.63	1.30	1.24
1	C	100	ASP	C-O	5.59	1.30	1.23
1	D	106	HIS	CE1-NE2	5.59	1.38	1.32
1	B	145	SER	N-CA	5.58	1.50	1.46
1	A	203	SER	CA-CB	-5.55	1.46	1.53
1	D	303	GLY	C-O	5.55	1.29	1.23
1	D	246	ALA	C-O	-5.55	1.17	1.24
1	B	67	GLU	CD-OE2	5.53	1.35	1.25
1	A	90	LEU	C-O	-5.51	1.17	1.24
1	A	20	ALA	C-O	5.48	1.30	1.24
1	B	290	THR	C-O	-5.47	1.16	1.24
1	D	23	ASP	CG-OD1	5.46	1.35	1.25
1	C	106	HIS	CE1-NE2	5.44	1.38	1.32
1	A	358	ARG	C-O	5.41	1.30	1.24
1	C	277	HIS	CE1-NE2	5.40	1.38	1.32
1	B	295	ALA	C-O	-5.37	1.17	1.24
1	C	376	SER	C-O	5.37	1.30	1.24
1	D	124	HIS	CE1-NE2	5.36	1.38	1.32
1	D	93	ASN	C-O	-5.35	1.17	1.24
1	D	25	ASP	C-O	-5.34	1.18	1.24
1	C	334	SER	C-O	5.29	1.30	1.24
1	C	328	TYR	C-O	-5.29	1.17	1.24
1	B	342	ILE	C-O	5.28	1.29	1.24
1	A	354	THR	C-O	5.28	1.30	1.23
1	A	134	VAL	N-CA	5.25	1.50	1.46
1	C	263	HIS	CD2-NE2	-5.24	1.32	1.37
1	C	266	ASN	C-O	5.20	1.30	1.24
1	C	288	LEU	C-O	5.16	1.30	1.24
1	A	67	GLU	CD-OE2	5.16	1.35	1.25
1	A	291	HIS	CE1-NE2	5.13	1.37	1.32
1	A	296	LEU	C-O	-5.11	1.18	1.24
1	D	160	ARG	CD-NE	-5.11	1.39	1.46
1	C	102	LEU	C-O	5.11	1.30	1.24
1	B	160	ARG	CD-NE	-5.09	1.39	1.46
1	B	245	ASP	CG-OD2	5.09	1.35	1.25
1	A	23	ASP	CG-OD1	5.07	1.34	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	203	SER	CA-CB	-5.05	1.46	1.53
1	A	93	ASN	C-O	-5.05	1.18	1.24
1	D	118	ALA	C-O	5.04	1.30	1.24
1	B	358	ARG	C-O	5.03	1.30	1.24
1	C	58	GLY	C-O	5.03	1.30	1.23
1	B	234	ALA	C-O	5.02	1.30	1.24
1	B	145	SER	CA-CB	-5.01	1.49	1.52

All (143) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	32	THR	CB-CA-C	13.95	126.47	109.31
1	B	129	THR	CB-CA-C	12.51	130.79	110.78
1	B	129	THR	CA-CB-OG1	-11.45	92.43	109.60
1	C	129	THR	CB-CA-C	10.51	127.21	110.19
1	A	160	ARG	CB-CA-C	9.60	126.06	109.65
1	B	32	THR	N-CA-CB	-9.53	95.22	109.90
1	C	32	THR	CB-CA-C	8.92	121.44	108.87
1	C	32	THR	N-CA-CB	-8.79	98.43	110.29
1	D	292	PRO	CA-C-N	-8.23	110.85	122.86
1	D	292	PRO	C-N-CA	-8.23	110.85	122.86
1	C	292	PRO	CA-C-N	-7.91	110.09	122.51
1	C	292	PRO	C-N-CA	-7.91	110.09	122.51
1	D	129	THR	CB-CA-C	7.84	122.89	110.19
1	D	160	ARG	CD-NE-CZ	7.83	135.37	124.40
1	A	144	GLN	CB-CG-CD	-7.71	99.49	112.60
1	B	160	ARG	CG-CD-NE	-7.64	95.19	112.00
1	D	160	ARG	NE-CZ-NH2	-7.44	112.51	119.20
1	A	117	ASN	CB-CA-C	7.43	123.48	110.85
1	C	165	ARG	CB-CA-C	-7.43	99.11	110.92
1	B	165	ARG	CG-CD-NE	-7.40	95.72	112.00
1	D	160	ARG	NE-CZ-NH1	7.37	128.87	121.50
1	C	393	ALA	CA-C-N	7.29	131.38	120.31
1	C	393	ALA	C-N-CA	7.29	131.38	120.31
1	C	135	PRO	CA-C-N	7.27	130.89	120.79
1	C	135	PRO	C-N-CA	7.27	130.89	120.79
1	D	160	ARG	CG-CD-NE	-7.24	96.06	112.00
1	C	160	ARG	CG-CD-NE	-7.10	96.37	112.00
1	C	160	ARG	NE-CZ-NH2	-6.80	113.08	119.20
1	D	107	ASP	CA-CB-CG	6.77	119.37	112.60
1	B	173	LYS	CB-CA-C	6.73	122.12	110.68
1	B	67	GLU	CB-CA-C	6.57	122.01	110.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	389	SER	CB-CA-C	-6.54	100.61	110.88
1	A	117	ASN	N-CA-C	-6.54	104.23	111.36
1	C	388	LEU	CA-C-O	-6.38	113.79	120.55
1	A	389	SER	CA-C-O	-6.30	114.20	120.82
1	C	160	ARG	CD-NE-CZ	6.26	133.17	124.40
1	A	313	GLU	CB-CG-CD	6.25	123.22	112.60
1	A	240	THR	CA-C-N	6.21	128.46	120.64
1	A	240	THR	C-N-CA	6.21	128.46	120.64
1	B	378	GLU	CB-CG-CD	6.20	123.14	112.60
1	C	276	GLY	CA-C-O	-6.13	112.54	119.04
1	C	101	THR	CB-CA-C	6.10	120.36	109.38
1	A	160	ARG	CB-CG-CD	6.04	125.20	111.30
1	B	129	THR	CA-CB-CG2	6.04	120.77	110.50
1	A	101	THR	CB-CA-C	6.03	120.40	109.37
1	C	129	THR	CA-CB-CG2	6.02	120.74	110.50
1	B	12	THR	CA-C-N	5.95	128.18	120.44
1	B	12	THR	C-N-CA	5.95	128.18	120.44
1	C	389	SER	CB-CA-C	-5.95	101.50	110.90
1	A	77	GLY	CA-C-N	5.94	125.69	121.65
1	A	77	GLY	C-N-CA	5.94	125.69	121.65
1	A	378	GLU	CB-CG-CD	5.93	122.68	112.60
1	B	160	ARG	NE-CZ-NH2	-5.90	113.89	119.20
1	B	117	ASN	CB-CA-C	5.89	120.86	110.85
1	C	160	ARG	NE-CZ-NH1	5.86	127.36	121.50
1	D	223	ASP	CB-CA-C	5.86	119.32	109.48
1	B	222	ARG	NE-CZ-NH2	5.84	124.45	119.20
1	B	143	ALA	N-CA-C	-5.82	106.14	113.18
1	A	100	ASP	CA-CB-CG	5.78	118.38	112.60
1	C	292	PRO	O-C-N	-5.78	116.03	123.03
1	A	9	THR	CA-CB-OG1	5.77	118.25	109.60
1	A	313	GLU	CA-C-O	-5.73	115.47	121.55
1	C	129	THR	CA-CB-OG1	-5.69	101.06	109.60
1	C	160	ARG	CB-CG-CD	5.69	124.38	111.30
1	D	292	PRO	O-C-N	-5.68	116.28	123.10
1	D	324	ASP	CA-CB-CG	5.68	118.28	112.60
1	A	10	PRO	N-CA-C	-5.67	102.90	111.41
1	C	383	ASP	CA-CB-CG	5.66	118.26	112.60
1	B	101	THR	CB-CA-C	5.58	119.59	109.37
1	A	256	LEU	CA-C-O	-5.58	114.93	120.90
1	D	373	GLY	O-C-N	5.58	127.61	122.81
1	A	280	VAL	CA-C-N	5.57	128.01	120.44
1	A	280	VAL	C-N-CA	5.57	128.01	120.44

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	129	THR	OG1-CB-CG2	5.54	120.38	109.30
1	B	394	THR	CA-CB-OG1	-5.54	101.29	109.60
1	B	222	ARG	CA-C-O	-5.52	115.02	120.82
1	A	324	ASP	CB-CA-C	5.52	119.99	110.77
1	A	120	ALA	CA-C-O	-5.51	114.58	120.42
1	A	32	THR	CB-CA-C	5.51	116.33	108.68
1	B	393	ALA	CA-C-N	5.49	128.65	120.31
1	B	393	ALA	C-N-CA	5.49	128.65	120.31
1	D	160	ARG	CB-CG-CD	5.47	123.89	111.30
1	D	169	GLU	CB-CG-CD	5.47	121.90	112.60
1	C	12	THR	CA-C-N	5.46	127.53	120.44
1	C	12	THR	C-N-CA	5.46	127.53	120.44
1	A	339	GLU	CB-CG-CD	5.45	121.87	112.60
1	B	9	THR	CB-CA-C	5.45	121.10	109.10
1	D	393	ALA	CA-C-N	5.45	129.82	120.72
1	D	393	ALA	C-N-CA	5.45	129.82	120.72
1	B	257	ASP	CB-CA-C	5.45	119.43	110.88
1	B	261	ARG	CB-CG-CD	-5.42	98.85	111.30
1	A	194	ASP	CA-CB-CG	5.40	118.00	112.60
1	A	390	ARG	N-CA-C	-5.39	105.41	111.28
1	A	160	ARG	NE-CZ-NH2	-5.38	114.35	119.20
1	C	290	THR	CA-CB-OG1	-5.38	101.53	109.60
1	D	135	PRO	CA-C-N	5.38	127.43	120.44
1	D	135	PRO	C-N-CA	5.38	127.43	120.44
1	D	356	GLU	N-CA-CB	5.36	117.85	110.07
1	D	165	ARG	CB-CA-C	-5.36	102.23	110.81
1	D	165	ARG	CG-CD-NE	-5.35	100.22	112.00
1	D	271	ALA	CA-C-O	-5.33	115.20	120.90
1	A	12	THR	CA-C-N	5.32	127.72	120.54
1	A	12	THR	C-N-CA	5.32	127.72	120.54
1	D	383	ASP	CA-CB-CG	5.30	117.90	112.60
1	A	160	ARG	N-CA-C	-5.27	102.48	110.28
1	C	390	ARG	N-CA-C	-5.26	105.54	111.28
1	A	31	VAL	N-CA-C	-5.26	105.59	110.53
1	C	299	ARG	CB-CA-C	5.25	118.42	109.24
1	B	31	VAL	N-CA-C	-5.24	105.61	110.53
1	A	109	TYR	CA-C-N	5.22	125.88	120.03
1	A	109	TYR	C-N-CA	5.22	125.88	120.03
1	D	47	GLY	CA-C-O	-5.22	113.16	119.00
1	A	222	ARG	NE-CZ-NH2	5.20	123.88	119.20
1	B	53	ASP	CA-CB-CG	5.20	117.80	112.60
1	C	271	ALA	CA-C-O	-5.20	115.34	120.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	160	ARG	CB-CG-CD	5.18	123.22	111.30
1	C	215	VAL	O-C-N	5.17	128.61	123.18
1	B	120	ALA	CA-C-O	-5.17	114.94	120.42
1	D	253	LEU	CA-C-O	-5.14	115.08	120.63
1	C	194	ASP	CA-CB-CG	5.14	117.74	112.60
1	C	389	SER	N-CA-CB	5.14	117.53	110.07
1	D	147	LYS	N-CA-C	-5.14	106.17	112.90
1	B	109	TYR	CA-C-N	5.14	125.78	120.03
1	B	109	TYR	C-N-CA	5.14	125.78	120.03
1	D	388	LEU	CA-C-O	-5.14	115.10	120.55
1	B	240	THR	CA-C-N	5.12	127.10	120.64
1	B	240	THR	C-N-CA	5.12	127.10	120.64
1	B	302	LYS	N-CA-C	-5.12	106.98	113.18
1	B	388	LEU	CA-C-O	-5.11	115.00	120.42
1	D	215	VAL	O-C-N	5.10	128.70	123.03
1	B	160	ARG	CD-NE-CZ	5.08	131.51	124.40
1	A	143	ALA	N-CA-C	-5.07	106.93	113.01
1	C	223	ASP	CB-CA-C	5.07	117.99	109.48
1	B	313	GLU	CB-CG-CD	5.06	121.19	112.60
1	A	389	SER	N-CA-CB	5.05	117.33	110.01
1	C	394	THR	CA-CB-OG1	-5.04	102.04	109.60
1	D	12	THR	CA-C-N	5.04	127.34	120.54
1	D	12	THR	C-N-CA	5.04	127.34	120.54
1	B	256	LEU	CA-C-O	-5.03	115.52	120.90
1	A	136	ARG	CB-CA-C	5.01	118.68	110.96
1	C	100	ASP	CA-CB-CG	5.01	117.61	112.60
1	B	339	GLU	CB-CG-CD	5.01	121.11	112.60
1	C	324	ASP	CA-CB-CG	5.00	117.60	112.60

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	202	HIS	Peptide
1	A	309	SER	Mainchain
1	B	160	ARG	Sidechain
1	B	202	HIS	Peptide
1	C	160	ARG	Sidechain
1	C	202	HIS	Peptide
1	C	9	THR	Peptide
1	D	160	ARG	Sidechain
1	D	202	HIS	Peptide

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Mol	Chain	Res	Type	Group
1	D	9	THR	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2870	0	2873	28	0
1	B	2870	0	2873	29	0
1	C	2870	0	2873	28	0
1	D	2870	0	2873	32	0
2	A	29	0	0	0	0
2	B	29	0	0	0	0
2	C	29	0	0	0	0
2	D	29	0	0	1	0
3	A	95	0	0	3	0
3	B	98	0	0	5	0
3	C	105	0	0	1	0
3	D	99	0	0	0	0
All	All	11993	0	11492	100	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

All (100) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:32:THR:HG23	3:C:660:HOH:O	1.73	0.88
1:C:93:ASN:O	1:D:122:LYS:NZ	2.06	0.88
1:C:122:LYS:NZ	1:D:93:ASN:O	2.13	0.81
1:B:391:ALA:O	1:B:394:THR:HB	1.82	0.79
1:B:32:THR:HG23	3:B:684:HOH:O	1.80	0.79
1:B:251:ARG:HH22	1:C:209:ASN:HD21	1.31	0.79
1:D:391:ALA:O	1:D:394:THR:HB	1.87	0.74
1:A:251:ARG:HH22	1:D:209:ASN:HD21	1.37	0.73
1:D:209:ASN:HD22	1:D:249:THR:HA	1.54	0.72
1:C:391:ALA:O	1:C:394:THR:HB	1.91	0.71

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:40:ASN:HD22	1:A:40:ASN:H	1.41	0.68
1:C:209:ASN:HD22	1:C:249:THR:HA	1.58	0.68
1:A:156:ASN:HD21	1:A:369:ARG:HH11	1.43	0.67
1:B:349:THR:OG1	1:B:350:HIS:HD2	1.79	0.66
1:B:209:ASN:HD22	1:B:249:THR:HA	1.60	0.66
1:B:251:ARG:NH2	1:C:209:ASN:HD21	1.93	0.66
1:B:40:ASN:H	1:B:40:ASN:HD22	1.46	0.63
1:A:251:ARG:NH2	1:D:209:ASN:HD21	1.95	0.63
1:D:349:THR:OG1	1:D:350:HIS:HD2	1.80	0.63
1:A:209:ASN:HD22	1:A:249:THR:HA	1.64	0.61
1:C:40:ASN:HD22	1:C:40:ASN:H	1.48	0.61
1:A:349:THR:OG1	1:A:350:HIS:HD2	1.84	0.61
1:D:136:ARG:CG	1:D:136:ARG:HH11	2.14	0.61
1:B:165:ARG:NH1	3:B:601:HOH:O	2.27	0.60
1:A:209:ASN:HD21	1:D:251:ARG:HH22	1.50	0.59
1:D:156:ASN:HD21	1:D:369:ARG:HH11	1.50	0.59
1:D:40:ASN:HD22	1:D:40:ASN:H	1.51	0.59
1:B:201:LEU:C	1:B:201:LEU:HD12	2.29	0.57
1:C:156:ASN:HD21	1:C:369:ARG:HH11	1.53	0.57
1:A:201:LEU:HD12	1:A:201:LEU:C	2.30	0.56
1:C:291:HIS:CD2	1:C:292:PRO:O	2.58	0.56
1:B:182:ASN:HD21	1:B:190:GLN:HB3	1.69	0.56
1:A:162:THR:CG2	3:A:654:HOH:O	2.54	0.56
1:A:24:ARG:NH1	1:A:67:GLU:OE2	2.40	0.55
1:C:349:THR:OG1	1:C:350:HIS:HD2	1.89	0.55
1:C:127:LEU:HD13	1:C:129:THR:HG22	1.89	0.54
1:C:163:ASP:HB2	1:C:296:LEU:HD11	1.89	0.54
1:A:162:THR:HG21	3:A:675:HOH:O	2.06	0.54
1:C:173:LYS:HE3	1:C:173:LYS:HA	1.90	0.54
1:B:162:THR:CG2	3:B:656:HOH:O	2.56	0.53
1:D:40:ASN:HD22	1:D:40:ASN:N	2.05	0.53
1:B:162:THR:HG21	3:B:681:HOH:O	2.08	0.52
1:C:40:ASN:HD22	1:C:40:ASN:N	2.07	0.52
1:D:163:ASP:HB2	1:D:296:LEU:HD11	1.93	0.51
1:D:109:TYR:CE2	1:D:111:GLY:HA3	2.46	0.51
1:A:162:THR:HG22	3:A:654:HOH:O	2.09	0.50
1:A:182:ASN:HD21	1:A:190:GLN:HB3	1.76	0.50
1:B:209:ASN:HD21	1:C:251:ARG:HH22	1.60	0.50
1:D:127:LEU:HD13	1:D:129:THR:HG22	1.94	0.49
1:C:109:TYR:CE2	1:C:111:GLY:HA3	2.47	0.49
1:B:156:ASN:HD21	1:B:369:ARG:HH11	1.60	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:93:ASN:O	1:B:122:LYS:NZ	2.45	0.49
1:D:206:LYS:HD2	1:D:335:LEU:HG	1.95	0.48
1:B:40:ASN:HD22	1:B:40:ASN:N	2.09	0.47
1:A:251:ARG:HH22	1:D:209:ASN:ND2	2.09	0.47
1:D:156:ASN:HA	1:D:157:PRO:HA	1.75	0.47
1:A:40:ASN:HD22	1:A:40:ASN:N	2.05	0.47
1:D:291:HIS:CD2	1:D:292:PRO:O	2.67	0.47
1:A:245:ASP:OD2	1:B:242:SER:HB2	2.15	0.47
1:B:162:THR:HG22	3:B:656:HOH:O	2.13	0.47
1:A:242:SER:HB2	1:B:245:ASP:OD2	2.15	0.46
1:B:127:LEU:HD13	1:B:129:THR:HG22	1.96	0.46
1:A:82:SER:HB3	1:B:82:SER:HB3	1.97	0.46
1:A:109:TYR:CE2	1:A:111:GLY:HA3	2.51	0.46
1:B:32:THR:HG21	1:C:212:SER:O	2.14	0.46
1:D:136:ARG:HH11	1:D:136:ARG:HG2	1.80	0.46
1:A:153:THR:HB	1:A:162:THR:HG23	1.98	0.45
1:A:209:ASN:HD21	1:D:251:ARG:NH2	2.12	0.45
1:A:156:ASN:ND2	1:A:369:ARG:HH11	2.12	0.45
1:A:11:CYS:HB2	1:A:15:THR:HB	1.98	0.45
1:B:156:ASN:HA	1:B:157:PRO:HA	1.77	0.45
1:C:206:LYS:HD2	1:C:335:LEU:HG	1.98	0.45
1:D:136:ARG:CG	1:D:136:ARG:NH1	2.78	0.45
2:D:501:EBO:O7	2:D:501:EBO:N1	2.47	0.44
1:D:207:TYR:CE1	1:D:336:GLY:HA2	2.53	0.44
1:B:40:ASN:ND2	1:D:31:VAL:HB	2.32	0.44
1:B:161:ILE:HG22	1:B:296:LEU:HD13	2.00	0.43
1:C:156:ASN:HD22	1:C:157:PRO:CA	2.31	0.43
1:C:98:PRO:HD2	1:D:122:LYS:O	2.18	0.43
1:C:157:PRO:HD3	1:C:350:HIS:CE1	2.54	0.42
1:D:156:ASN:HD22	1:D:157:PRO:CA	2.32	0.42
1:B:209:ASN:HD21	1:C:251:ARG:NH2	2.18	0.42
1:C:345:PRO:HA	1:C:349:THR:OG1	2.20	0.42
1:A:207:TYR:CE1	1:A:336:GLY:HA2	2.54	0.42
1:B:154:PRO:HD3	1:B:185:LEU:CD1	2.49	0.42
1:C:207:TYR:CE1	1:C:336:GLY:HA2	2.54	0.42
1:A:311:GLU:OE1	1:A:364:SER:OG	2.30	0.41
1:D:156:ASN:ND2	1:D:369:ARG:HH11	2.16	0.41
1:D:345:PRO:HA	1:D:349:THR:OG1	2.20	0.41
1:D:156:ASN:HD22	1:D:156:ASN:C	2.28	0.41
1:A:40:ASN:N	1:A:40:ASN:ND2	2.69	0.41
1:A:156:ASN:HA	1:A:157:PRO:HA	1.84	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:121:LYS:HB3	1:C:121:LYS:HE2	1.55	0.41
1:C:156:ASN:HA	1:C:157:PRO:HA	1.85	0.41
1:B:33:PRO:HA	1:B:34:PRO:HD3	1.83	0.41
1:D:101:THR:HG21	1:D:128:ILE:HD12	2.02	0.41
1:D:242:SER:HA	1:D:243:PRO:HD3	1.81	0.41
1:C:201:LEU:C	1:C:201:LEU:HD12	2.46	0.41
1:B:154:PRO:HD3	1:B:185:LEU:HD12	2.02	0.40
1:D:121:LYS:HE2	1:D:121:LYS:HB3	1.69	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	385/408 (94%)	376 (98%)	7 (2%)	2 (0%)	24	37
1	B	385/408 (94%)	375 (97%)	9 (2%)	1 (0%)	36	50
1	C	385/408 (94%)	378 (98%)	6 (2%)	1 (0%)	36	50
1	D	385/408 (94%)	378 (98%)	7 (2%)	0	100	100
All	All	1540/1632 (94%)	1507 (98%)	29 (2%)	4 (0%)	36	50

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	334	SER
1	B	334	SER
1	A	206	LYS
1	C	334	SER

5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	291/310 (94%)	266 (91%)	25 (9%)	10	16
1	B	291/310 (94%)	268 (92%)	23 (8%)	11	19
1	C	291/310 (94%)	268 (92%)	23 (8%)	11	19
1	D	291/310 (94%)	270 (93%)	21 (7%)	13	23
All	All	1164/1240 (94%)	1072 (92%)	92 (8%)	11	19

All (92) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	THR
1	A	40	ASN
1	A	67	GLU
1	A	71	GLU
1	A	72	LEU
1	A	101	THR
1	A	121	LYS
1	A	127	LEU
1	A	135	PRO
1	A	136	ARG
1	A	144	GLN
1	A	157	PRO
1	A	162	THR
1	A	173	LYS
1	A	242	SER
1	A	253	LEU
1	A	273	LEU
1	A	296	LEU
1	A	302	LYS
1	A	311	GLU
1	A	312	LEU
1	A	313	GLU
1	A	327	ARG
1	A	335	LEU

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Mol	Chain	Res	Type
1	A	395	LEU
1	B	32	THR
1	B	40	ASN
1	B	71	GLU
1	B	72	LEU
1	B	101	THR
1	B	127	LEU
1	B	129	THR
1	B	136	ARG
1	B	147	LYS
1	B	157	PRO
1	B	162	THR
1	B	165	ARG
1	B	242	SER
1	B	253	LEU
1	B	273	LEU
1	B	296	LEU
1	B	302	LYS
1	B	311	GLU
1	B	312	LEU
1	B	313	GLU
1	B	327	ARG
1	B	335	LEU
1	B	394	THR
1	C	32	THR
1	C	40	ASN
1	C	71	GLU
1	C	72	LEU
1	C	101	THR
1	C	121	LYS
1	C	127	LEU
1	C	129	THR
1	C	135	PRO
1	C	136	ARG
1	C	173	LYS
1	C	191	LYS
1	C	242	SER
1	C	272	GLU
1	C	273	LEU
1	C	296	LEU
1	C	299	ARG
1	C	302	LYS

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Mol	Chain	Res	Type
1	C	311	GLU
1	C	312	LEU
1	C	313	GLU
1	C	335	LEU
1	C	394	THR
1	D	40	ASN
1	D	71	GLU
1	D	72	LEU
1	D	121	LYS
1	D	127	LEU
1	D	129	THR
1	D	135	PRO
1	D	136	ARG
1	D	156	ASN
1	D	165	ARG
1	D	228	GLN
1	D	242	SER
1	D	253	LEU
1	D	273	LEU
1	D	296	LEU
1	D	311	GLU
1	D	312	LEU
1	D	313	GLU
1	D	335	LEU
1	D	356	GLU
1	D	394	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	40	ASN
1	A	97	GLN
1	A	117	ASN
1	A	156	ASN
1	A	182	ASN
1	A	209	ASN
1	A	281	ASN
1	A	301	GLN
1	A	350	HIS
1	B	40	ASN
1	B	48	ASN
1	B	97	GLN

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Mol	Chain	Res	Type
1	B	156	ASN
1	B	182	ASN
1	B	209	ASN
1	B	301	GLN
1	B	350	HIS
1	C	40	ASN
1	C	89	ASN
1	C	156	ASN
1	C	182	ASN
1	C	209	ASN
1	C	291	HIS
1	C	350	HIS
1	D	40	ASN
1	D	117	ASN
1	D	156	ASN
1	D	182	ASN
1	D	209	ASN
1	D	291	HIS
1	D	301	GLN
1	D	350	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond

length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	EBO	C	501	-	28,29,29	2.75	12 (42%)	34,40,40	4.11	17 (50%)
2	EBO	D	501	-	28,29,29	2.42	10 (35%)	34,40,40	4.69	21 (61%)
2	EBO	B	501	-	28,29,29	3.37	14 (50%)	34,40,40	4.47	17 (50%)
2	EBO	A	501	-	28,29,29	2.94	13 (46%)	34,40,40	4.62	18 (52%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	EBO	C	501	-	-	11/26/26/26	0/1/1/1
2	EBO	D	501	-	-	13/26/26/26	0/1/1/1
2	EBO	B	501	-	-	8/26/26/26	0/1/1/1
2	EBO	A	501	-	-	7/26/26/26	0/1/1/1

All (49) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	EBO	C2-C1	8.57	1.49	1.41
2	B	501	EBO	C3-C4	7.17	1.51	1.42
2	C	501	EBO	C3-C4	7.07	1.51	1.42
2	A	501	EBO	P-C6	6.58	1.89	1.79
2	D	501	EBO	C3-C4	6.21	1.50	1.42
2	B	501	EBO	C9-C8	6.11	1.60	1.53
2	C	501	EBO	P-C6	5.72	1.88	1.79
2	A	501	EBO	C3-C4	5.67	1.49	1.42
2	B	501	EBO	P-C6	5.50	1.88	1.79
2	B	501	EBO	C5-C4	5.43	1.48	1.37
2	A	501	EBO	C2-C1	5.43	1.46	1.41
2	A	501	EBO	C5-C4	5.15	1.47	1.37
2	A	501	EBO	C9-C8	5.09	1.59	1.53
2	C	501	EBO	C2-C1	5.00	1.46	1.41
2	A	501	EBO	P-O1	4.34	1.59	1.50
2	B	501	EBO	P-O1	4.28	1.58	1.50
2	D	501	EBO	P-O1	4.25	1.58	1.50
2	D	501	EBO	O3-C14	-4.17	1.17	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	EBO	P-C6	4.11	1.86	1.79
2	C	501	EBO	C10-S	-4.07	1.66	1.81
2	C	501	EBO	C9-C8	3.98	1.58	1.53
2	D	501	EBO	C9-C8	-3.87	1.48	1.53
2	C	501	EBO	C5-C4	3.66	1.44	1.37
2	D	501	EBO	C5-C4	3.58	1.44	1.37
2	C	501	EBO	O3-C14	-3.56	1.19	1.30
2	D	501	EBO	C11-S	-3.53	1.68	1.81
2	B	501	EBO	C10-S	-3.41	1.68	1.81
2	A	501	EBO	C8-C15	-3.41	1.48	1.52
2	A	501	EBO	C6-C4	3.02	1.55	1.51
2	C	501	EBO	C3-C2	2.91	1.45	1.41
2	A	501	EBO	C8-N1	2.83	1.50	1.46
2	B	501	EBO	P-O	-2.82	1.48	1.55
2	A	501	EBO	C10-S	-2.74	1.71	1.81
2	B	501	EBO	C8-N1	2.60	1.49	1.46
2	B	501	EBO	C3-C2	2.60	1.45	1.41
2	C	501	EBO	C8-N1	-2.58	1.43	1.46
2	B	501	EBO	O5-C15	2.55	1.29	1.22
2	A	501	EBO	O3-C14	-2.52	1.22	1.30
2	B	501	EBO	C11-S	-2.52	1.72	1.81
2	A	501	EBO	P-O2	-2.50	1.49	1.55
2	B	501	EBO	O3-C14	-2.47	1.22	1.30
2	D	501	EBO	C3-C2	2.42	1.45	1.41
2	D	501	EBO	C2-C1	2.38	1.43	1.41
2	B	501	EBO	C8-C15	-2.31	1.49	1.52
2	C	501	EBO	C11-S	-2.27	1.73	1.81
2	A	501	EBO	C11-S	-2.26	1.73	1.81
2	C	501	EBO	O5-C15	2.21	1.28	1.22
2	D	501	EBO	C-C1	2.20	1.53	1.50
2	C	501	EBO	C-C1	2.14	1.53	1.50

All (73) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	EBO	P-C6-C4	14.61	141.02	114.06
2	C	501	EBO	P-C6-C4	14.48	140.78	114.06
2	A	501	EBO	P-C6-C4	14.38	140.60	114.06
2	B	501	EBO	P-C6-C4	13.57	139.10	114.06
2	A	501	EBO	O2-P-C6	11.76	135.87	106.78
2	D	501	EBO	O2-P-C6	11.68	135.66	106.78
2	B	501	EBO	O-P-C6	11.45	135.10	106.78

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	EBO	O1-P-C6	9.96	134.12	111.30
2	D	501	EBO	O-P-O1	-7.62	92.68	112.39
2	A	501	EBO	C-C1-C2	-7.27	112.29	120.80
2	D	501	EBO	O2-P-O1	-7.22	93.70	112.39
2	D	501	EBO	C2-C3-C4	6.72	123.67	118.28
2	B	501	EBO	O-P-O1	-6.70	95.06	112.39
2	A	501	EBO	O2-P-O1	-6.31	96.07	112.39
2	B	501	EBO	C5-C4-C3	-6.13	107.65	118.21
2	B	501	EBO	O2-P-O1	-6.05	96.75	112.39
2	C	501	EBO	O-P-O1	-6.05	96.75	112.39
2	A	501	EBO	C8-N1-C7	5.94	125.59	116.77
2	A	501	EBO	C5-C4-C3	-5.90	108.05	118.21
2	C	501	EBO	C5-C4-C3	-5.90	108.05	118.21
2	D	501	EBO	C5-C4-C3	-5.86	108.11	118.21
2	C	501	EBO	C2-C3-C4	5.66	122.82	118.28
2	B	501	EBO	C8-N1-C7	5.59	125.07	116.77
2	A	501	EBO	O-P-O1	-5.50	98.16	112.39
2	B	501	EBO	C-C1-C2	-5.43	114.44	120.80
2	A	501	EBO	C4-C5-N	5.40	132.63	123.83
2	B	501	EBO	O1-P-C6	-5.14	99.54	111.30
2	B	501	EBO	C4-C5-N	5.08	132.10	123.83
2	A	501	EBO	C9-C10-S	-5.06	102.15	113.45
2	B	501	EBO	C9-C10-S	-4.88	102.55	113.45
2	C	501	EBO	C9-C8-C15	4.76	117.39	109.48
2	D	501	EBO	C-C1-N	4.66	126.42	117.64
2	D	501	EBO	C9-C10-S	-4.50	103.42	113.45
2	A	501	EBO	C9-C8-C15	4.43	116.84	109.48
2	D	501	EBO	O-P-C6	4.36	117.56	106.78
2	D	501	EBO	C6-C4-C5	-4.35	114.31	119.19
2	A	501	EBO	C12-C13-N2	-4.33	98.84	110.12
2	D	501	EBO	C9-C8-C15	4.26	116.56	109.48
2	B	501	EBO	O2-P-C6	4.19	117.13	106.78
2	B	501	EBO	C9-C8-C15	4.10	116.30	109.48
2	C	501	EBO	C-C1-C2	-4.06	116.05	120.80
2	C	501	EBO	C4-C5-N	4.03	130.39	123.83
2	D	501	EBO	C-C1-C2	-4.02	116.09	120.80
2	A	501	EBO	O1-P-C6	-3.91	102.35	111.30
2	C	501	EBO	C-C1-N	3.84	124.87	117.64
2	A	501	EBO	C-C1-N	3.80	124.80	117.64
2	D	501	EBO	O3-C14-O4	-3.72	115.64	124.08
2	B	501	EBO	C-C1-N	3.70	124.62	117.64
2	B	501	EBO	C2-C3-C4	3.62	121.18	118.28

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	EBO	C2-C3-C7	-3.58	113.94	120.40
2	C	501	EBO	C6-C4-C5	-3.56	115.19	119.19
2	C	501	EBO	O-P-O2	-3.50	98.00	107.96
2	B	501	EBO	O3-C14-O4	-3.47	116.21	124.08
2	D	501	EBO	C12-C13-N2	3.37	118.90	110.12
2	C	501	EBO	O2-P-O1	-3.34	103.75	112.39
2	A	501	EBO	O3-C14-O4	-3.26	116.68	124.08
2	A	501	EBO	C2-C3-C4	3.21	120.86	118.28
2	B	501	EBO	C12-C13-N2	-3.17	101.84	110.12
2	C	501	EBO	C2-C3-C7	-2.98	115.01	120.40
2	D	501	EBO	C12-C11-S	-2.95	106.87	113.45
2	D	501	EBO	O1-P-C6	-2.92	104.62	111.30
2	C	501	EBO	O3-C14-O4	-2.88	117.53	124.08
2	C	501	EBO	O2-P-C6	2.86	113.84	106.78
2	B	501	EBO	C12-C11-S	-2.84	107.11	113.45
2	D	501	EBO	C2-C1-N	-2.76	117.48	120.96
2	D	501	EBO	C4-C5-N	2.74	128.30	123.83
2	A	501	EBO	O-P-C6	2.73	113.52	106.78
2	C	501	EBO	C10-C9-C8	-2.61	102.96	113.77
2	D	501	EBO	O-P-O2	-2.40	101.13	107.96
2	A	501	EBO	C12-C11-S	-2.29	108.34	113.45
2	A	501	EBO	C5-N-C1	-2.27	115.08	119.20
2	C	501	EBO	C12-C11-S	-2.09	108.79	113.45
2	D	501	EBO	C8-N1-C7	2.07	119.84	116.77

There are no chirality outliers.

All (39) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	EBO	C15-C8-C9-C10
2	A	501	EBO	N1-C8-C9-C10
2	A	501	EBO	C15-C8-N1-C7
2	A	501	EBO	C9-C8-N1-C7
2	A	501	EBO	C3-C4-C6-P
2	A	501	EBO	C5-C4-C6-P
2	B	501	EBO	C15-C8-C9-C10
2	B	501	EBO	N1-C8-C9-C10
2	B	501	EBO	C15-C8-N1-C7
2	B	501	EBO	C9-C8-N1-C7
2	B	501	EBO	C3-C4-C6-P
2	B	501	EBO	C5-C4-C6-P
2	C	501	EBO	C15-C8-C9-C10

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Mol	Chain	Res	Type	Atoms
2	C	501	EBO	N1-C8-C9-C10
2	C	501	EBO	C15-C8-N1-C7
2	C	501	EBO	C9-C8-N1-C7
2	C	501	EBO	C3-C4-C6-P
2	C	501	EBO	C5-C4-C6-P
2	C	501	EBO	C4-C6-P-O1
2	D	501	EBO	O5-C15-C8-C9
2	D	501	EBO	C15-C8-N1-C7
2	D	501	EBO	C9-C8-N1-C7
2	D	501	EBO	C11-C12-C13-C14
2	D	501	EBO	C11-C12-C13-N2
2	D	501	EBO	C3-C4-C6-P
2	D	501	EBO	C5-C4-C6-P
2	D	501	EBO	S-C10-C9-C8
2	C	501	EBO	S-C11-C12-C13
2	B	501	EBO	C4-C6-P-O
2	D	501	EBO	C4-C6-P-O2
2	D	501	EBO	O6-C15-C8-C9
2	C	501	EBO	C4-C6-P-O
2	D	501	EBO	C4-C6-P-O1
2	A	501	EBO	O5-C15-C8-N1
2	C	501	EBO	O5-C15-C8-N1
2	D	501	EBO	O5-C15-C8-N1
2	D	501	EBO	C9-C10-S-C11
2	C	501	EBO	C9-C10-S-C11
2	B	501	EBO	C9-C10-S-C11

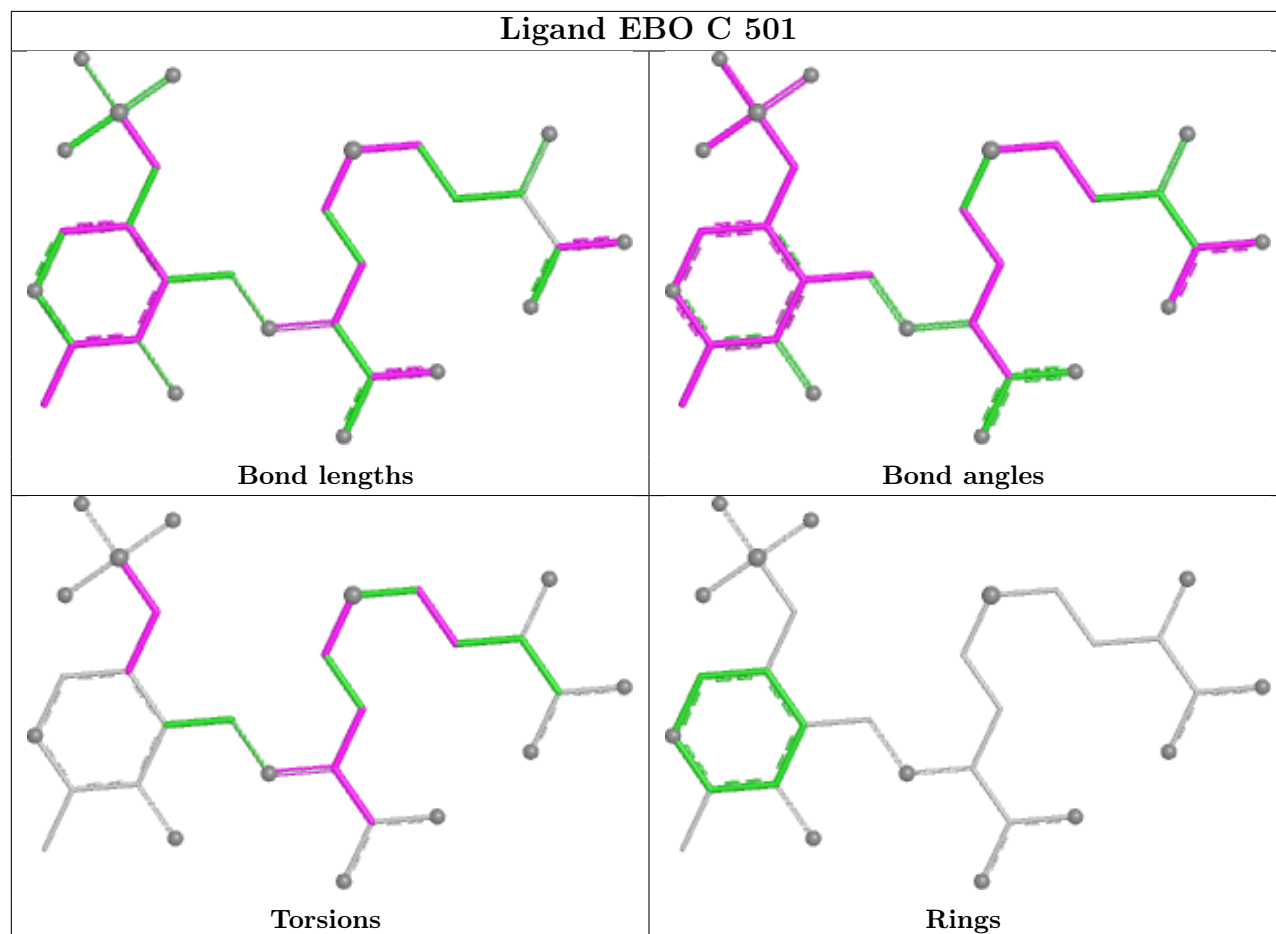
There are no ring outliers.

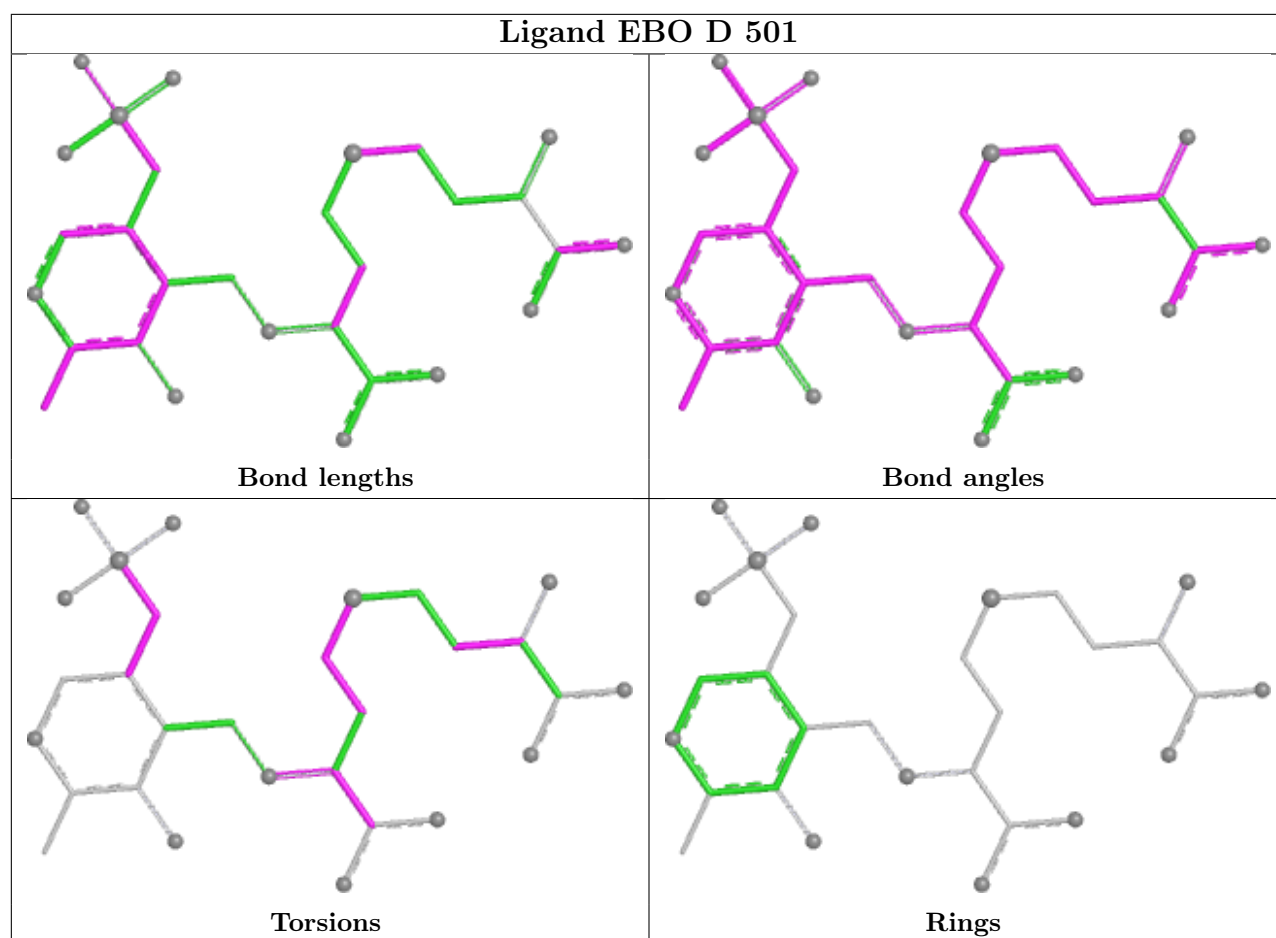
1 monomer is involved in 1 short contact:

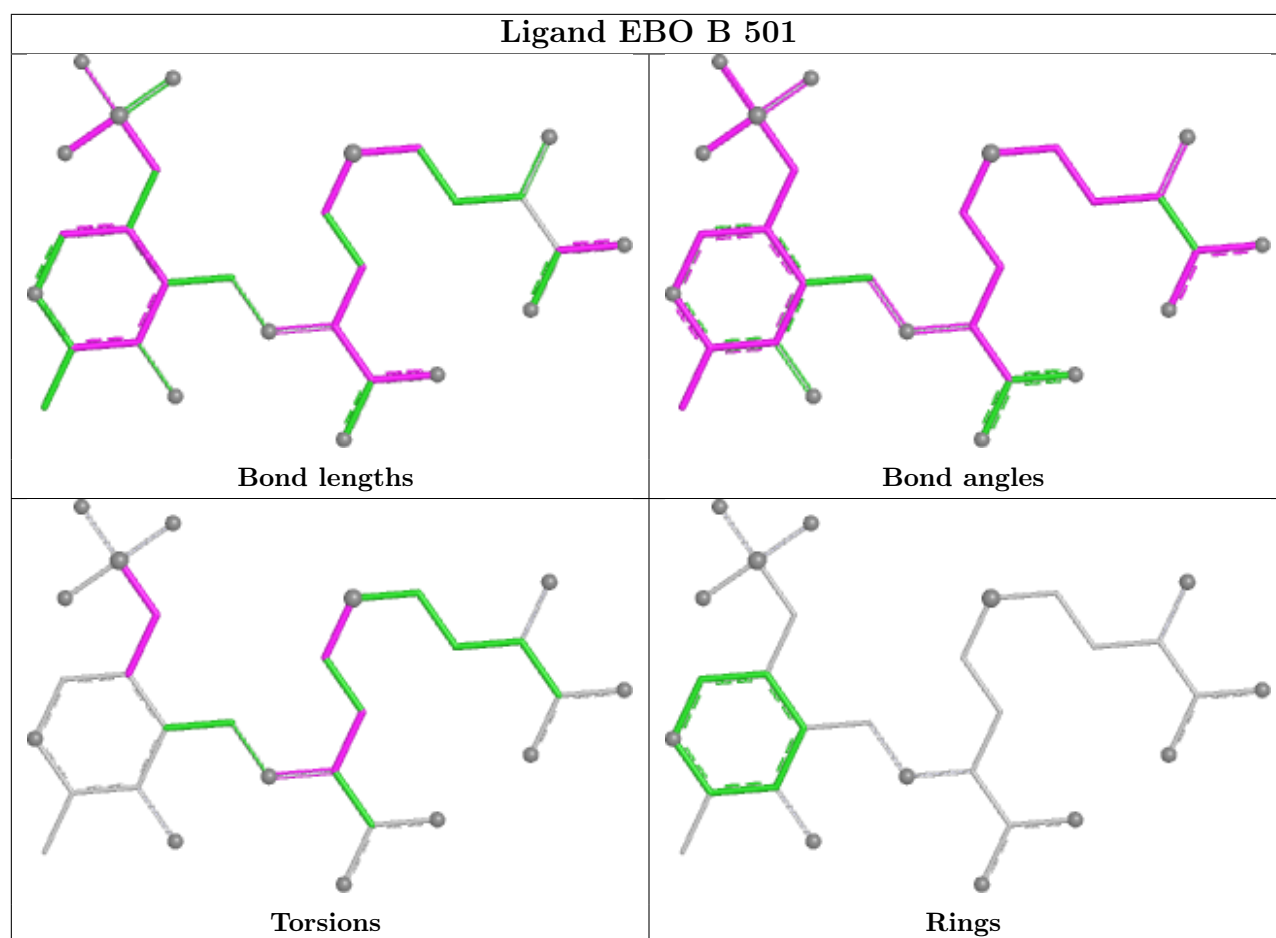
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	EBO	1	0

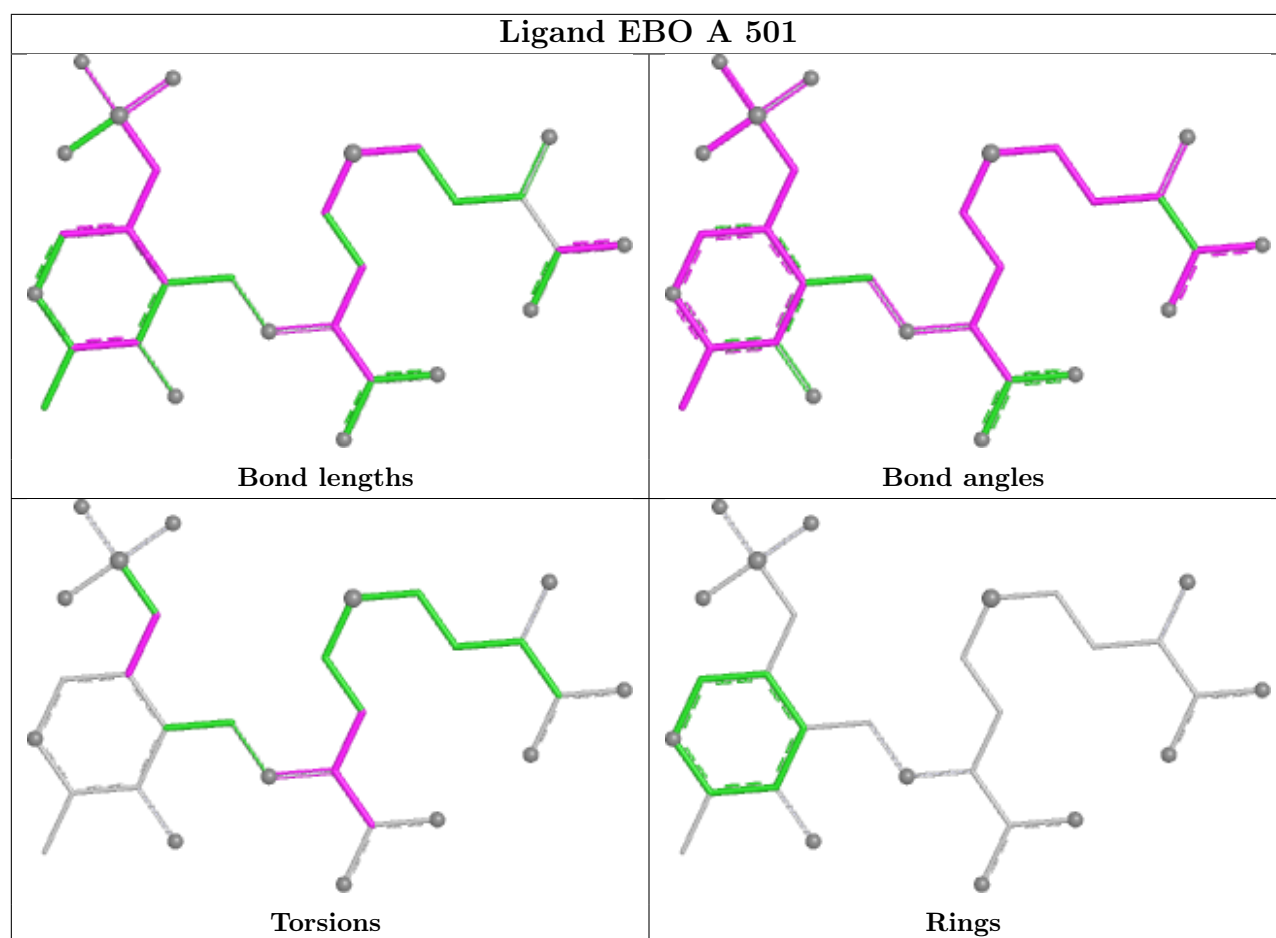
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	387/408 (94%)	-1.56	0 100 100	20, 29, 49, 83	0
1	B	387/408 (94%)	-1.56	0 100 100	20, 29, 51, 84	0
1	C	387/408 (94%)	-1.52	0 100 100	19, 30, 52, 100	0
1	D	387/408 (94%)	-1.51	0 100 100	20, 30, 52, 98	0
All	All	1548/1632 (94%)	-1.54	0 100 100	19, 29, 52, 100	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

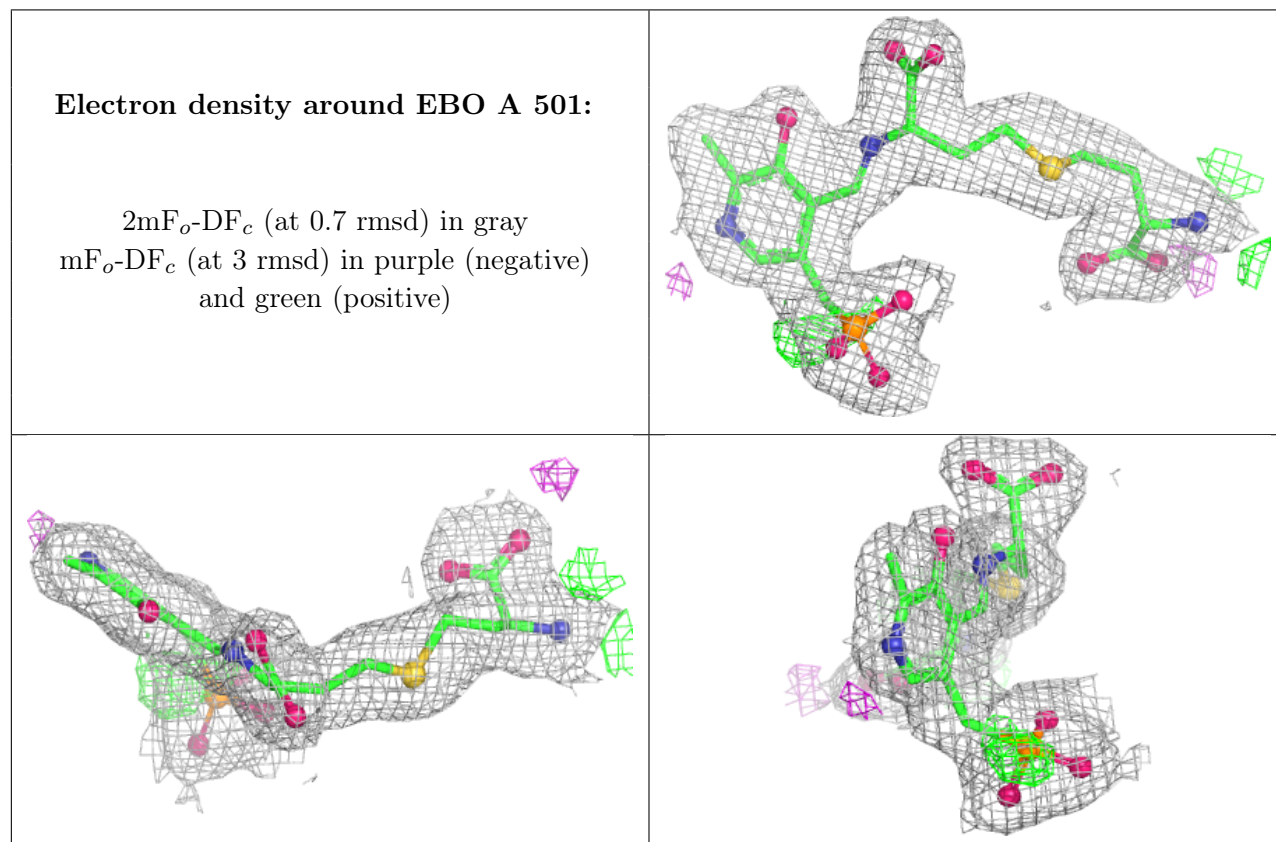
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

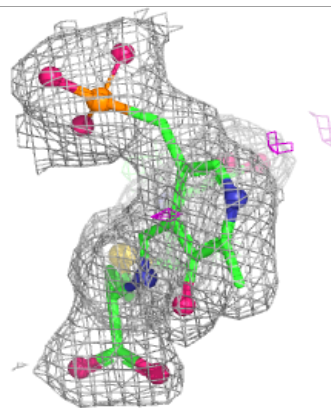
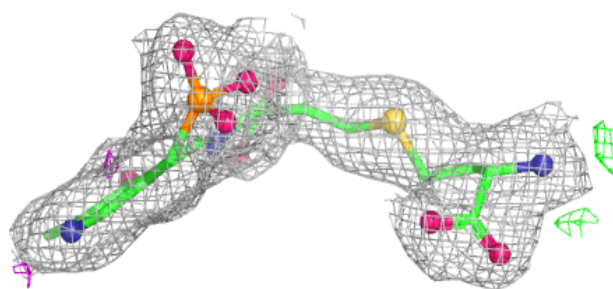
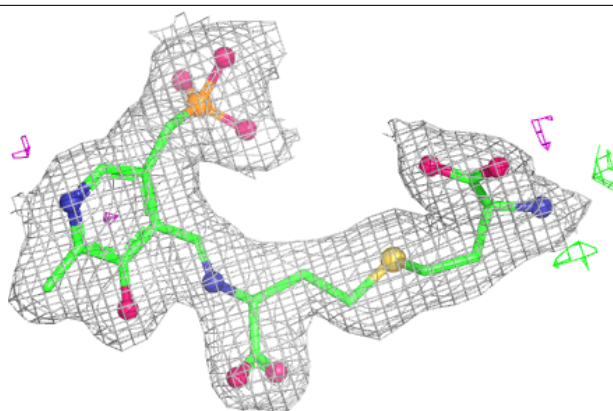
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	EBO	A	501	29/29	1.00	0.03	18,26,35,41	0
2	EBO	B	501	29/29	1.00	0.03	19,26,34,41	0
2	EBO	C	501	29/29	1.00	0.02	19,24,39,44	0
2	EBO	D	501	29/29	1.00	0.02	17,26,33,42	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

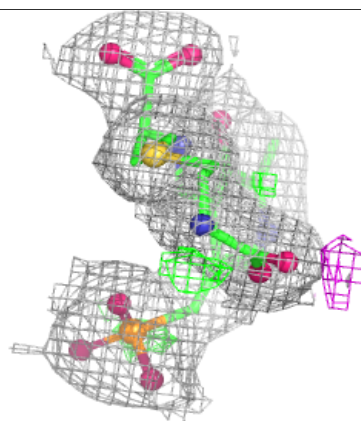
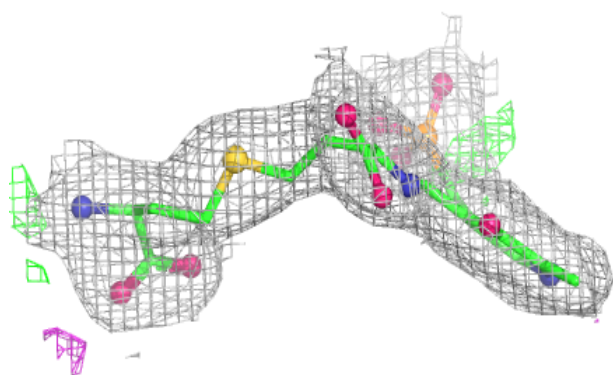
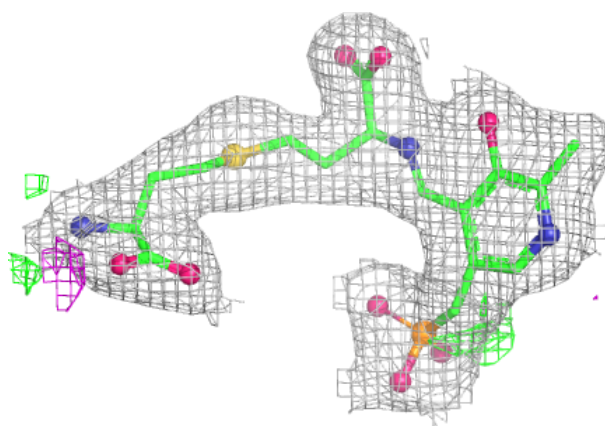


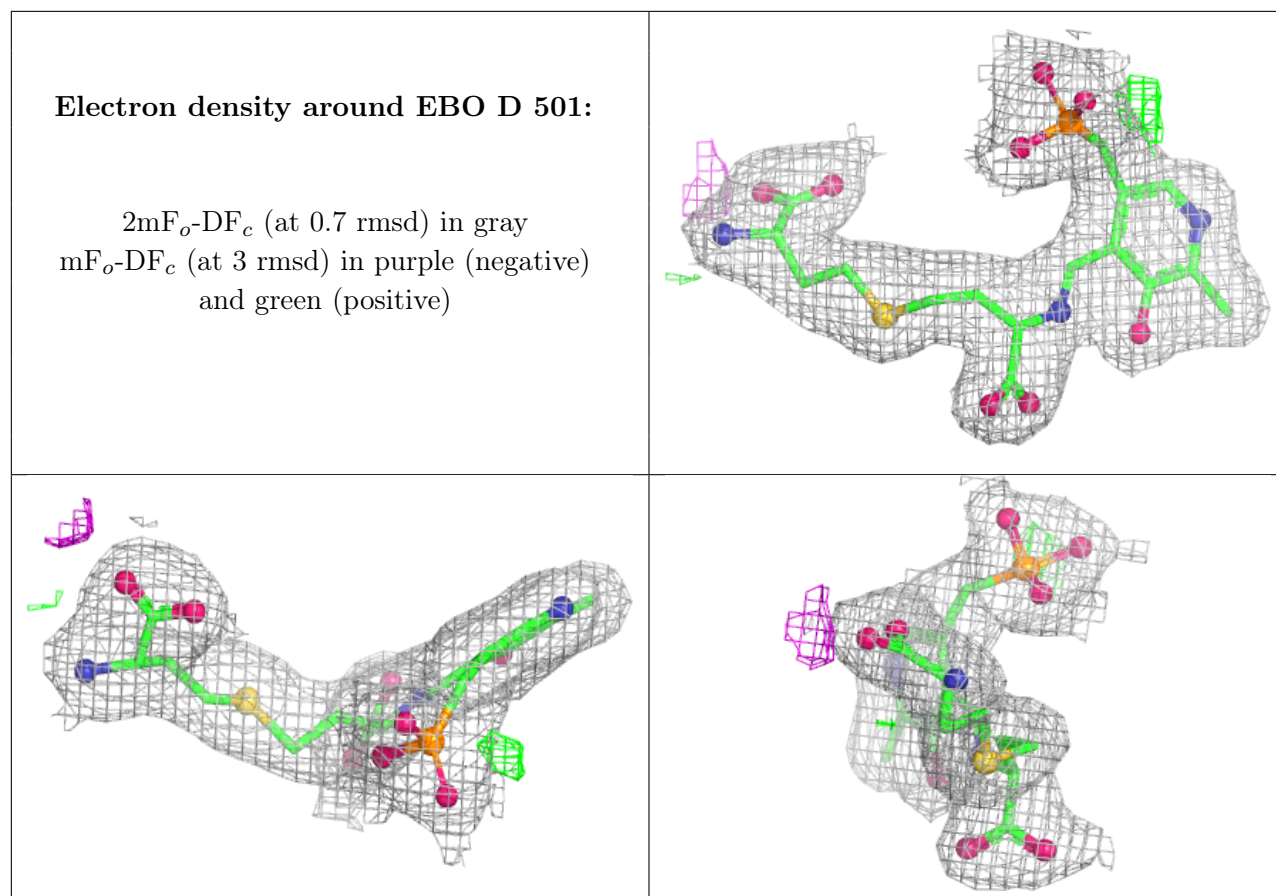
Electron density around EBO B 501:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around EBO C 501:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)





6.5 Other polymers ⓘ

There are no such residues in this entry.